OMI NO_2 Validation at JPL/Table Mountain Facility

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Approach

- Direct solar absorption using the FTUVS interferometer (UV-vis-NIR) at Table Mountain Facility, north of Los Angeles, California
- Spectral resolution 0.0013 nm – resolves NO_2 vibronic features
- Doppler-shifted spectra from east & west solar limbs are ratioed to remove Fraunhofer lines – no high-sun reference spectra needed.
- Method retrieves diurnal, absolute NO_2 column abundance
- A “calibration” method for other techniques.

Measurements

- Data acquired twice per week, on average (FTUVS is time-shared with other Aura validation activities).
- OMI NO_2 column abundances are retrieved from the AVDC archive.
- Comparisons between FTUVS and OMI are sorted according to distance between Table Mtn. and the center of the closest OMI footprint.

NO_2 column abundances are derived from fits within microwindows that contain 10-20 NO_2 rotational lines.

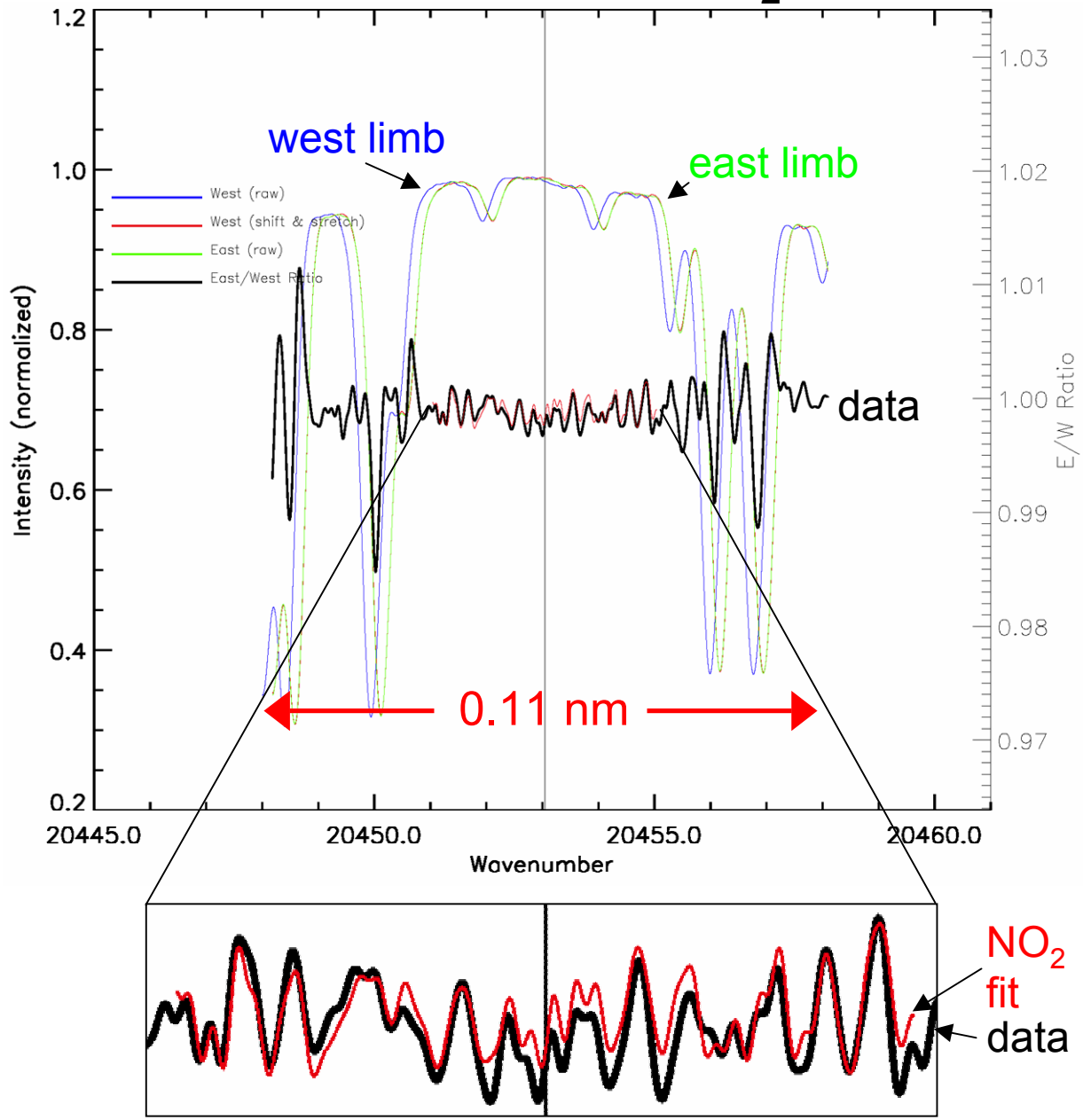
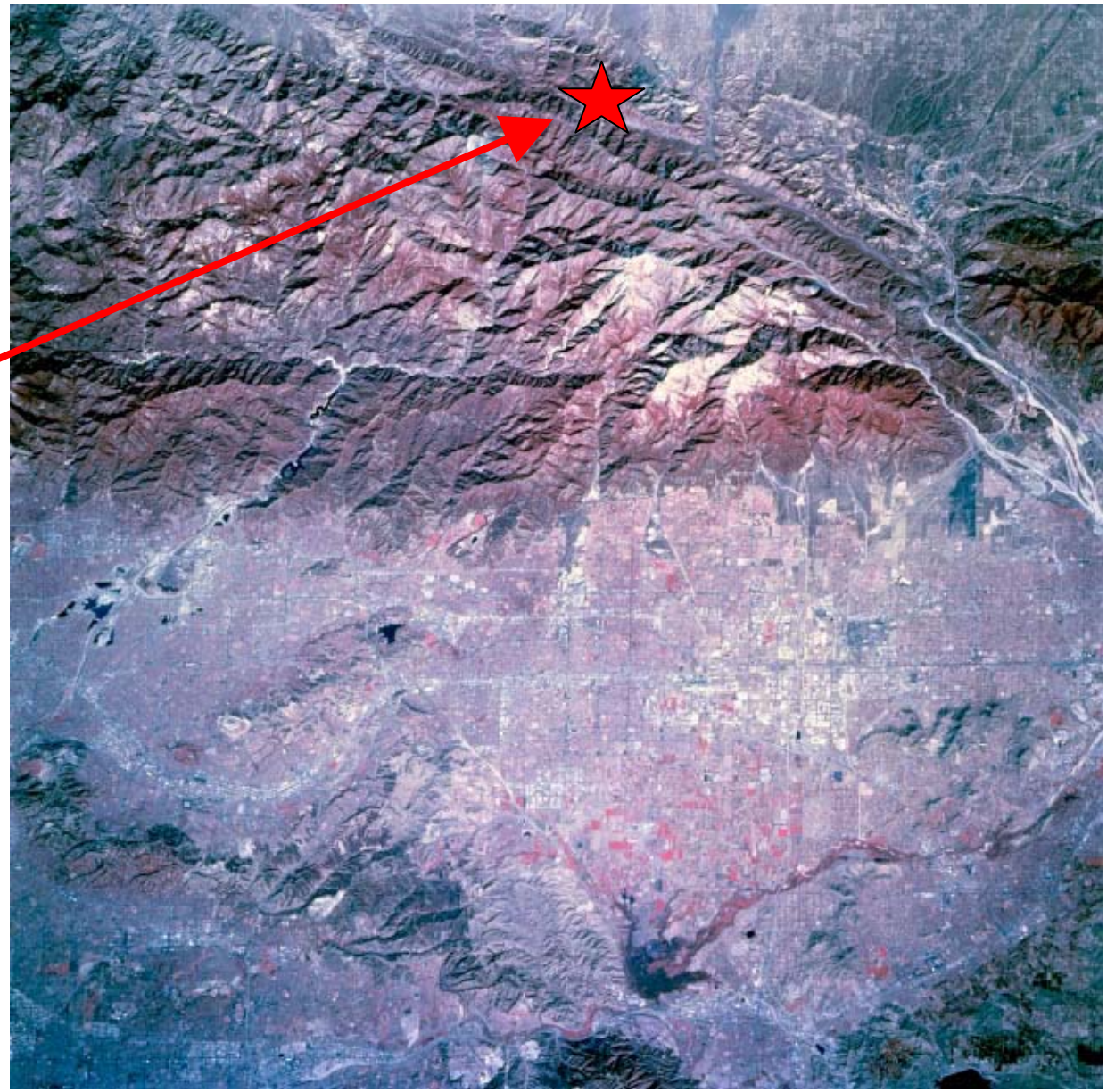
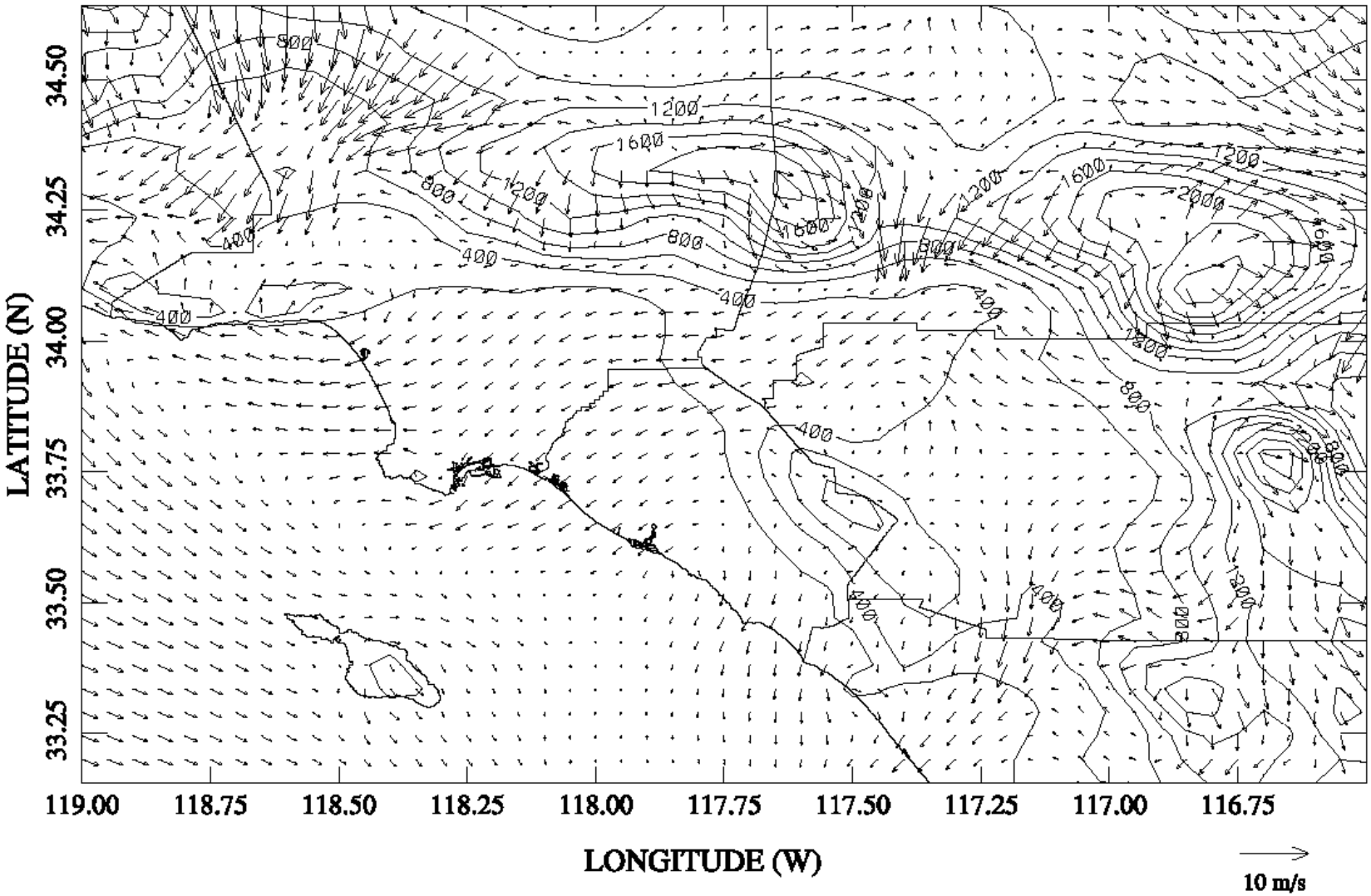


Table Mtn. Facility is located at 7500 ft. on the northward facing slopes of the San Gabriel Mtns.

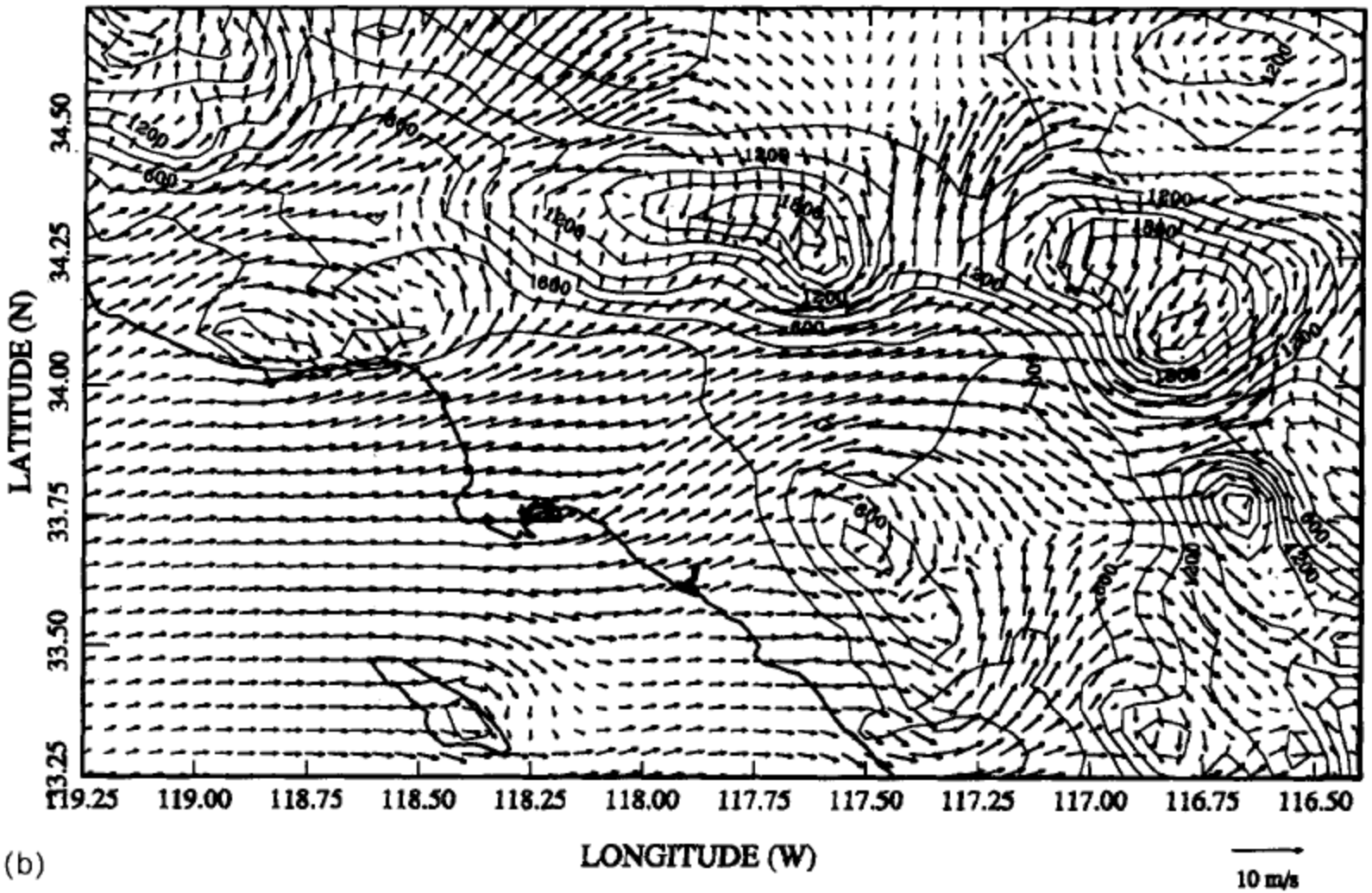


UCLA SMOG model, 0400 PST

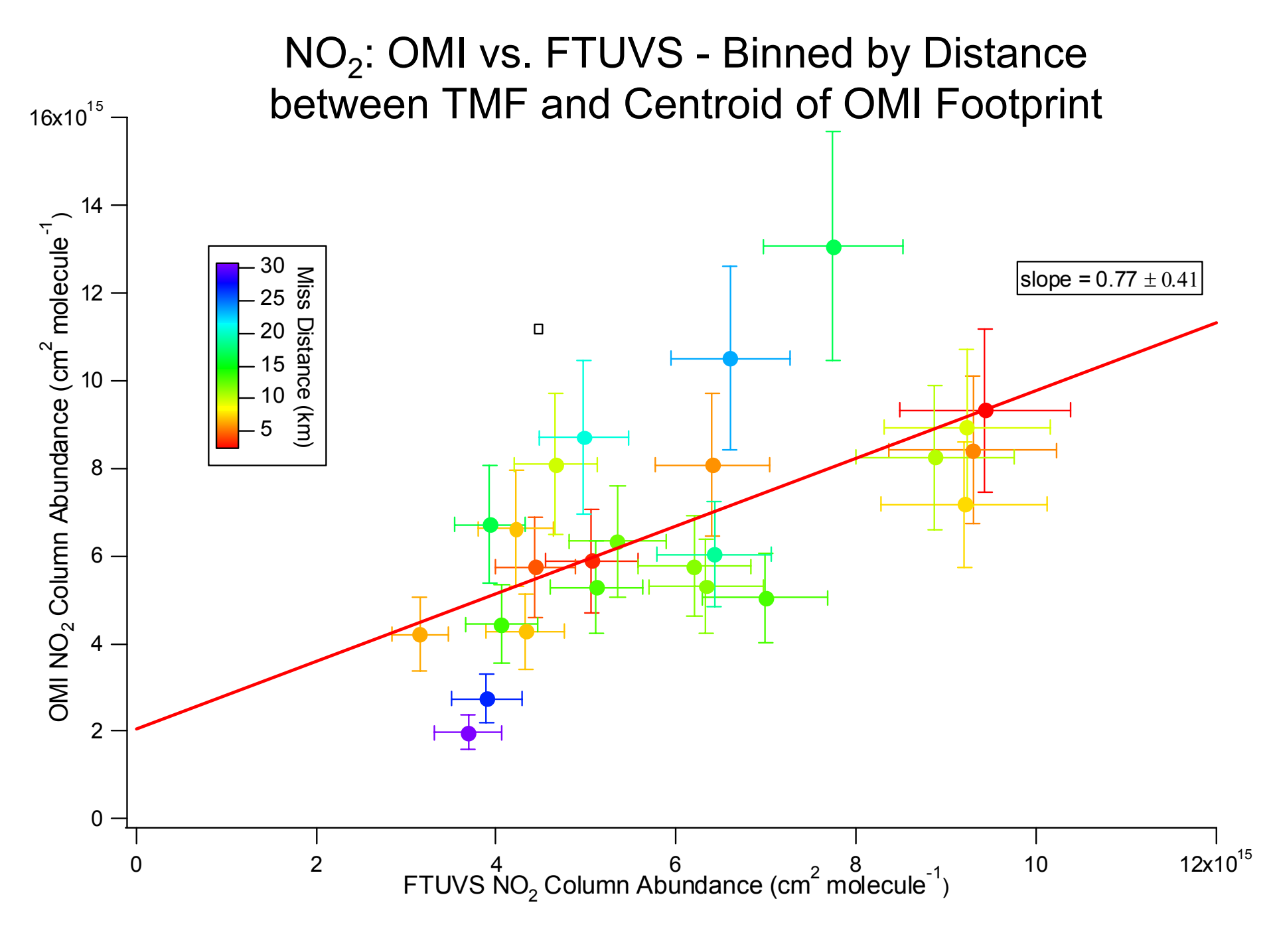


Lu et al. (2003)

UCLA SMOG model, 1700 PST

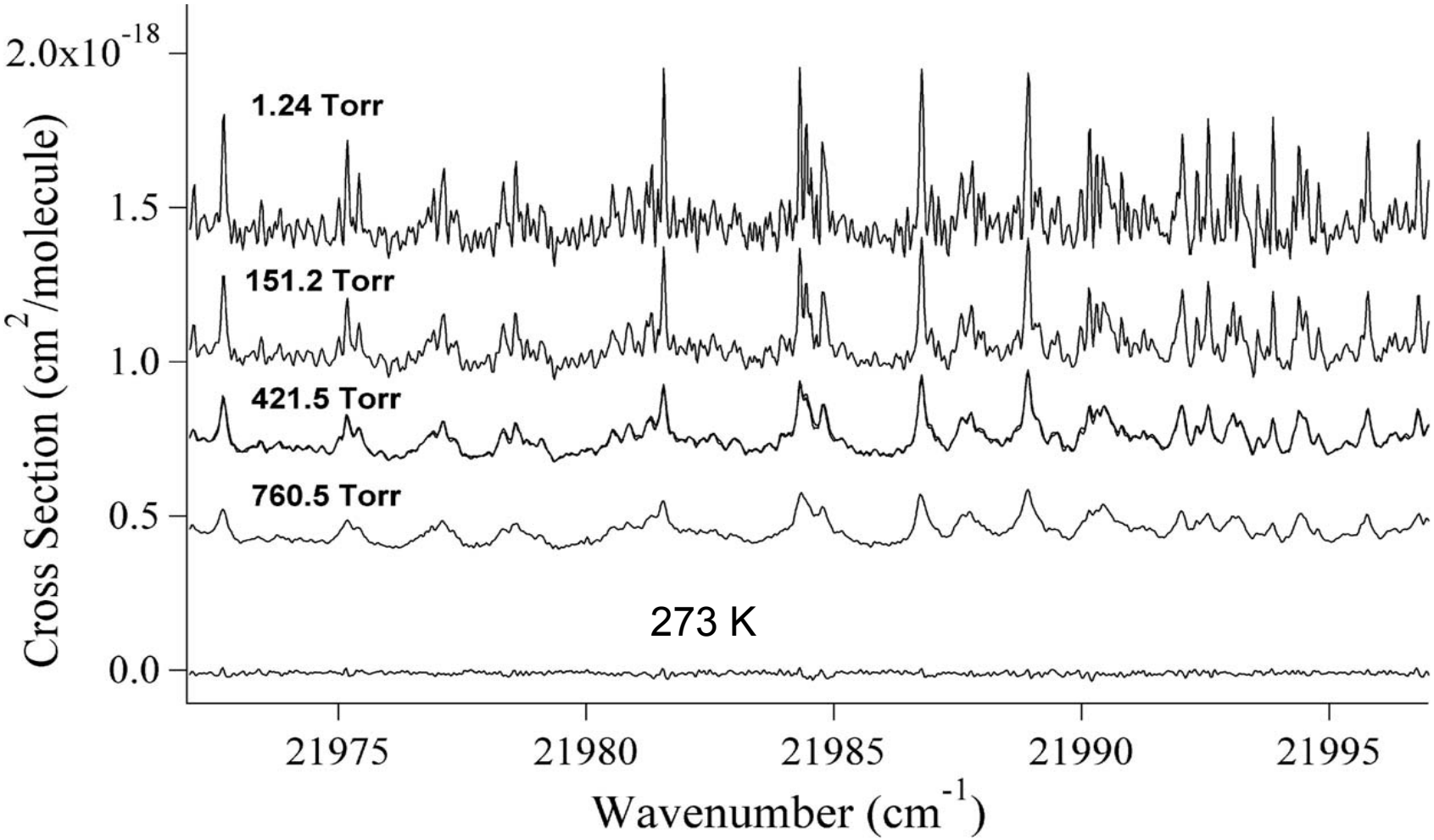


Lu and Turco (1995)


NO2: OMI vs. FTUVS - Binned by Distance between TMF and Centroid of OMI Footprint
16x10^15
14
12
10
8
6
4
2
0
OMI NO2 Column Abundance (cm^2 molecule^-1)
30
25
20
15
10
5
Miss Distance (km)
slope = 0.77 ± 0.41
0
2
4
6
8
10
12x10^15
FTUVS NO2 Column Abundance (cm^2 molecule^-1)

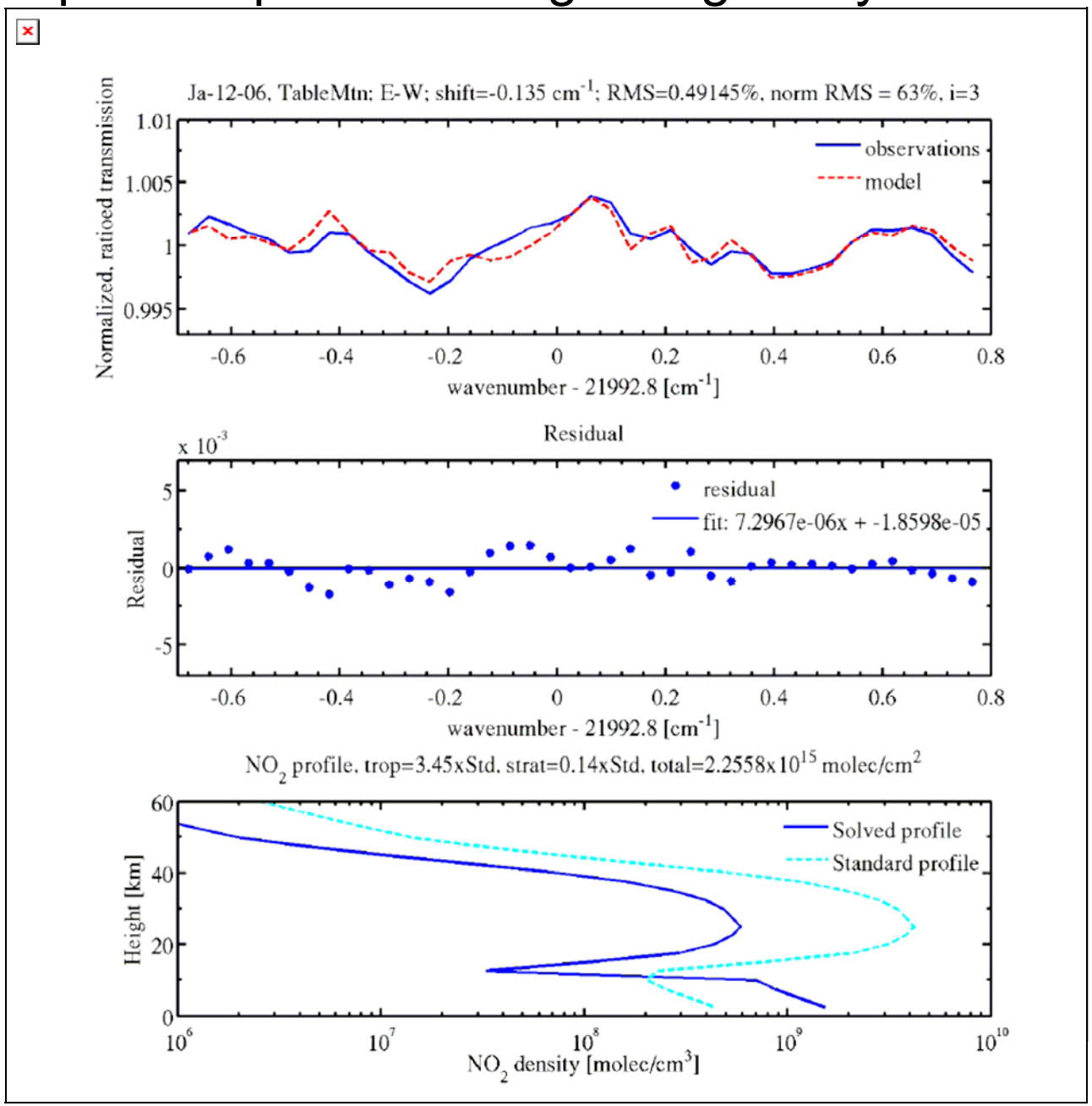
Pressure Broadening in NO_2 Reference Spectra

Comparison of NO_2 spectral features recorded at 0.05 cm^{-1} resolution.



Nizkorodov et al. (2004)

Optimal Spectral Fitting Using 2-Layer Model



Summary and Future Work

- The correlation between OMI and FTUVS NO_2 total column is reasonable – OMI lies 20-30% below FTUVS.
- Complex topography and circulation require that the OMI footprint centroid should be less than 10 km from TMF.
- *Intercomparison campaign* for NO_2 and O_3 at TMF with the WSU MF-DOAS and GSFC direct sun instruments in May ’07. Other groups welcome.
- FTUVS NO_2 2-level retrieval shows promise – development is continuing.